Chapter 5

Army Airspace Command and Control Connectivity

This chapter identifies and describes the Army airspace command and control (A2C2) system; messages and reports; various interconnectivity links; and the subsystems used to accomplish A2C2 tasks. These descriptions provide the A2C2 element with the tools to perform the A2C2 functions regardless of the command structure of the operating environment.

> For the near to mid term, A2C2 elements rely on procedural controls to deconflict airspace users and to minimize associated fratricide risks. Further reduction of fratricide risk requires advancements in integrating the Army Battle Command System software and hardware technology. Substantial progress is being made in the A2C2 arena with developed and integrated advanced hardware and software for Army Battle Command Systems.

A2C2 SYSTEM

5-1. The Army Battle Command System (ABCS), a US Army program, consists of systems that are related, connected, or both. It provides A2C2 and airspace management capabilities. The A2C2 system includes standardized common message and report formats, common data links, and battlefield automated systems that support the battlefield operating systems of fire support, maneuver, intelligence and electronic warfare, air defense, and combat service support. The ABCS software packages are evolving. A2C2 elements must coordinate with the battlefield automation system support specialists to determine the capabilities available on their specific Army Battle Command System. The Army requires a digitized, integrated, and automated system to provide total Army airspace command and control. This A2C2 system must, at a minimum, be capable of—

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- Interfacing with the Airborne Warning and Control System (AWACS), the International Civil Aviation Organization, and the Federal Aviation Administration Air Traffic Control System for real-time airspace management.
- Interoperating with all allied and joint systems.
- Interfacing with all Army information systems (INFOSYS).
- Directly interfacing with the Theater Battle Management Core System (TBMCS).
- Interfacing in near real-time with artillery, military intelligence, aviation, and air defense artillery systems and being able to transmit, receive, and graphically display data from these systems.
- Directly interconnecting with higher, lower, and lateral A2C2 systems to ensure rapid and accurate data transfer.

5-2. The primary provider of these capabilities is the Tactical Airspace Integration System (TAIS). It is the Army's enabling system for digitization, integration, and automation of A2C2 planning and operations as well as air traffic services. The TAIS is a component of the Army Battle Command System and supports the maneuver battlefield operating systems (BOS) (see Appendix C).

DIGITAL MESSAGE FORMATS

5-3. There are two basic types of digital messages based on format and message size: United States message text format (USMTF) and joint variable message format (VMF). The USMTF messages are used predominantly on the Army Tactical Command and Control System (ATCCS), the Global Command and Control System (GCCS), and joint command and control (C2) automation systems. VMF messages are used at the platform level to support Force XXI Battle Command Brigade and Below (FBCB2) and the tactical Internet.

5-4. *United States Message Text Format.* This format is an established set of standards, rules, and conventions governing message text formats. These standards provide common voice and automation templates that allow interoperability for all military operations. A2C2 elements use two types of USMTF messages and reports. They are ABCS templates and voice templates. Appendix A discusses these messages and reports. Additional information on USMTF may be found in the Joint User Handbook-Message Text Formats (JUH-MTF) and FM 6-99.2.

5-5. *Joint Variable Message Format.* This format consists of only essential information, allowing shorter messages than USMTF for reduced transmission time and network clutter. The messages support the information transmission and processing of FBCB2 from the platform up to embedded battle command software on the ATCCS. The ABCS can parse selected messages.

TACTICAL DIGITAL INFORMATION LINKS

5-6. Tactical digital information links (TADILs) are standardized communication links. They are suitable for transmission of digital and, in some cases, voice information. All Army INFOSYS use TADILs to transmit and receive

data. TADILs are characterized by their standard message and transmission formats. Several TADILs are used:

- TADIL-A/Link 11 is a secure, half-duplex that receives or transmits—but not both simultaneously—a sequential data exchange digital link. It exchanges digital information among airborne, land-based, and shipboard tactical data systems. It is the primary means to exchange data beyond line of sight. TADIL-A can be used on either high frequency (HF) or ultrahigh frequency (UHF). However, the Army uses only HF.

- TADIL-B/Link 11B is a full duplex, point-to-point, secure link used to simultaneously exchange tactical data between land-based units. TADIL-B uses super high frequency, very high frequency (VHF), UHF, and landlines for exchange. An adaptable surface interface terminal is required to translate interim Joint Tactical Information Distribution System (JTIDS) message specification into TADIL-B for exchanges between AWACS and TADIL-B users.

- TADIL-C/Link 4 is an unsecured, point-to-point link. It provides digital surface-to-air, air-to-surface, and air-to-air tactical communications. It is a general-purpose digital communications link between a control station and a controlled aircraft. TADIL-C uses UHF. The information exchange may be half- or full-duplex, depending on the ground platform and aircraft.

- Army tactical data link (ATDL)-1 is a secure, full duplex, point-to-point link for exchanging digital information among Army systems and between Army or Marine INFOSYS and surface-to-air missile systems. ATDL-1 uses UHF, VHF, or landlines to exchange information.

- Interim JTIDS message specification (IJMS) is a secure, line of sight, half-duplex, netted link supporting both voice and data communications for JTIDS users. IJMS provides the means to exchange digital information between aircraft and land-based units. IJMS is jam resistant and will be used as the interim link until TADIL-J is fully fielded.

- TADIL-J/Link 16 is a secure, jam-resistant, netted link that supports both voice and data communications. TADIL-J is used to exchange real-time data of air, ground, and maritime surveillance, electronic warfare, and intelligence.

- Patriot digital information link (PADIL) is a secure, full duplex, point-to-point link for exchanging digital information among Patriot batteries and between the battery and battalion control vans. PADIL uses UHF or landlines to exchange information. Only the battalion fire direction center (FDC) can exchange data with non-Patriot units or centers.

- Forward area air defense (FAAD) data link is used exclusively within the forward area air defense command, control, and intelligence system. It supports rapidly disseminating information used for target alerting, warning, and cueing.

- NATO Link 1 is a point-to-point, digital data link employed for the automatic data exchange of real-time tactical air defense and aircraft control units. NATO Link 1 can be used as a one-way (simplex) or two-way (duplex) link.

SUBSYSTEMS DESCRIPTIONS

5-7. The elements of the subsystems function and connect in the Theater Air-Ground System (TAGS). These subsystems include the TBMCS; Command and Control Initiatives Program (C2IP) system; ABCS; GCCS-Army; Maneuver Control System (MCS); Advanced Field Artillery Tactical Data System (AFATDS); Aviation Mission Planning System (AMPS); Joint Warning and Reporting Network (JWARN); Air and Missile Defense Planning and Control System (AMDPCS); Air Defense System Integrator (ADSI); TAIS; All Source Analysis System (ASAS); Integrated Meteorological System (IMETS); Digital Topographic Support System (DTSS); Combat Service Support Control System (CSSCS); and FBCB2. This section highlights the ABCS capabilities used for A2C2 rather than provides a detailed description for each.

Subsystems Descriptions	
• TBMCS	• AMDPCS
• C2IP system	• ADSI
• ABCS	• TAIS
• GCCS-Army	• ASAS
• MCS	• IMETS
• AFATDS	• DTSS
• AMPS	• CSSCS
• JWARN	• FBCB2

TBMCS

5-8. The Air Force uses the Theater Battle Management Core System to construct, disseminate, and execute the air tasking order (ATO) and airspace control order (ACO). The TBMCS interfaces with AFATDS, AMDPCS, and TAIS to support the production of the ATO, ACO, and airspace control measures request.

C2IP SYSTEM

5-9. The C2IP system is the Air Force information system used by the airlift coordination cell within the joint air operations center (JAOC). The system manages the request and execution of in-theater airlift requests. The C2IP system receives airlift requests from the joint movement control center and tracks their status.

THE ARMY BATTLE COMMAND SYSTEM

5-10. The ABCS is an integrated combination of automated C2 systems with horizontal and vertical digital interoperability and connectivity from echelons above corps to the individual platform or soldier level. Its three major components are the Global Command and Control System-Army (GCCS-Army), Army Tactical Command and Control System, and FBCB2.

5-11. The Army Tactical Command and Control System is the group of automation systems supporting the major BOS at corps, division, brigade, and battalion operations centers and command posts. Its major component systems that support the Army Air-Ground System include—

- MCS. Maneuver Control System (operations).
- ASAS. All Source Analysis System (intelligence).
- AFATDS. Advanced Field Artillery Tactical Data System (fire support).
- CSSCS. Combat Service Support Control System (administrative and logistics).

- AMDPCS. Air and Missile Defense Planning Control System (workstation for air defense elements from battery level to echelons above corps).
- TAIS. Tactical Airspace Integration System (air traffic services and A2C2).

5-12. These systems share information with each other, ensuring a common operational picture (COP). Friendly forces can develop and execute a highly integrated battle plan at a tempo that overwhelms opposing forces. It provides automatic data distribution for timely, horizontal, and vertical coordination by exchanging messages, maps, and graphic overlays.

GCCS-ARMY

5-13. The Global Command and Control System-Army provides a C2 system built around the defense information infrastructure common operational environment; it is being integrated with the DOD GCCS. GCCS-Army is fundamentally a GCCS with additional Army functionality. GCCS-Army displays the joint, globally-shared COP. The COP includes both friendly and enemy ground, air, and sea forces as well as battlefield geometry. Air tracks can be color-coded to reflect different ATO sorties.

5-14. The GCCS-Army capabilities cover communications, map backgrounds and overlay graphics, security, system management, workstation management, planning, intelligence, and user utilities. The capabilities of particular interest to A2C2 elements include communications, map backgrounds and overlay graphics, planning, and intelligence.

5-15. *Communications.* Communications include the Automated Message Handling System, message parsing, message fill, and routing.

5-16. *Map backgrounds and overlay graphics.* Map backgrounds and overlay graphics include—
- Standard National Imagery and Mapping Agency (NIMA) data.
- Datum transformation and coordinate conversion.
- Overlay graphics of—
    - Real-time display of friendly and enemy ground units.
    - Friendly and enemy aircraft.
    - Cruise missiles.
    - Unmanned aerial vehicles (UAVs) in flight.
    - Friendly and enemy ships.
    - Tactical ballistic missile (TBM) launch points, flight paths, and impact areas.
- Displayed battlefield graphics.
- Draw capability.

5-17. *Planning.* Planning includes—
- Global Status of Resources and Training System that graphically interfaces to a common pool of information about the status and location of military forces through the world.

- Joint Operation Planning and Execution System tools that develop courses of action for crisis management.
- Joint Maritime Command Information System that tracks the status, location, projected movement, and threat status of ships, submarines, airplanes, and shore units.

5-18. *Intelligence.* Intelligence includes the Joint Deployment Intelligence Support System that provides connectivity and interoperability with intelligence systems.

MANEUVER CONTROL SYSTEM

5-19. The MCS is the primary battle command automation system deployed from corps to battalion level. It provides commanders and operations staffs with the ability to collect, coordinate, and act on near real-time battlefield information and visualization. A MCS workstation also belongs to the G3 air. Designated S3 airs at brigade and battalion use the S3's MCS. With MCS as the focal automation system supporting the G3 air, other liaisons to the A2C2 element bring digitized capabilities developed within their functional areas. These digital capabilities allow direct transfer of situation-specific A2C2 information and tailored display of the airspace overlay. Sending detailed graphics and large text files digitally to an A2C2 liaison officer (LNO) is more practical than sending lengthy voice communications required to convey the same information.

5-20. Digitization supporting other BOS at the A2C2 element may include the capability to cover map backgrounds and overlay graphics, messages and reports, planning, and user utilities. Capabilities of interest to A2C2 elements include map backgrounds and overlay graphics, messages and reports, and planning.

5-21. *Map backgrounds and overlay graphics.* Map backgrounds and overlay graphics include—
- Filter by unit type and size.
- Overlay creation and distribution.
- Overlay function for marking and labeling points of interest.
- Information sent on the MCS monitor using "Snap Shot" to AFATDS for comments.
- Attached operation orders (OPORDs) to the situation map.

5-22. *Messages and reports.* Messages and reports include—
- S302 free text messages.
- S507L friendly unit locations.
- S201 battlefield geometry.
- The ability to create distribution lists and automatically forwarded messages.

5-23. *Planning.* Planning covers—
- The course of action function allowing commanders to schedule events by unit to ensure proper coordination of effort.
- OPORD and operation plan creation.

ADVANCED FIELD ARTILLERY TACTICAL DATA SYSTEM

5-24. The Advanced Field Artillery Tactical Data System is the fire support automated workstation component of ATCCS. It provides automated support for field artillery operations, to include joint and combined fires. It provides command, control, and communications for the Army and Marine Corps cannon, rockets, missiles, mortars, close air support, and naval surface weapon systems. This system enhances commanders with the ability to influence the battle by providing the right mix of firing platforms and munitions to defeat enemy targets. The system has high altitude weather sensors that input to the planned trajectory of munitions giving the most accurate projected use of airspace and airspace control measure requests to TAIS and TBMCS.

5-25. The AFATDS provides commanders with the ability to conduct automatic digital coordination on all fire support requests. It also checks incoming fire missions against the fire support coordinating measure (FSCM), airspace control measure (ACM), and unit zone of responsibility. AFATDS notifies the operator of any violations and electronically requests clearance from the unit that established the control measure. The unit must approve or deny the request before the mission can continue processing.

5-26. The AFATDS has capabilities of interest to A2C2 elements:

- Processes ATO (received from TBMCS, displayed, parsed, and transmitted to other information systems).
- Processes ACO (received from TBMCS, parsed specific ACMs, displayed as geometry, and transmitted to other information systems).
- Deconflicts ACMs with FSCMs.
- Transmits call for fires.
- Checks mission requests for violations to FSCMs and initiates automatic coordination.
- Displays airspace overlay provided by TAIS.

AVIATION MISSION PLANNING SYSTEM

5-27. The AMPS is an automated mission planning and synchronization workstation designed specifically for aviation brigade, battalion, and company commanders. Another system is authorized to each maneuver brigade and aviation A2C2 element liaison team. The AMPS provides the automated capability to plan, rehearse, and synchronize aviation missions. The aviation A2C2 LNOs—with the AMPS connected on the tactical operations center (TOC) local area network (LAN) and HF radio backup—can pull aviation mission planning to refine airspace requirements.

JOINT WARNING AND REPORTING NETWORK

5-28. The JWARN is an automated workstation linked via tactical communications to nuclear, biological, and chemical (NBC) detection devices in the theater. It provides comprehensive NBC warning, reporting, and analysis capabilities and can display the type of event, time of the event, type of burst or agent, area of contamination, downwind hazard, and units affected. It is the joint program that grew out of the Army Automated Nuclear, Biological, and Chemical Information System.

AIR AND MISSILE DEFENSE PLANNING CONTROL SYSTEM

5-29. The AMDPCS is a mission essential system that provides air defense artillery (ADA) commanders, staffs, and fire control crews with automated capabilities to enhance the execution of air and missile defense (AMD) operations. The AMDPCS is comprised of systems based on commercial and military power generation systems, environmental control systems, tentage or deployable rapid assembly shelters, and standard integrated command post shelters mounted on HMMWVs.

5-30. The AMDPCS contains Army generic and air defense unique radio systems. These radio systems support the multi-TADIL communication architecture, and commercial off-the-shelf and common hardware and software automated data processing equipment developed for the ABCS and the defense information infrastructure common operating environment. Appropriate configurations of the AMDPCS will be fielded at all echelons from short range air defense battery and high-to-medium altitude air defense battery through the echelons above corps (EAC) and corps ADA brigades to the Army air and missile defense command (AAMDC) or elements thereof.

5-31. The AMDPCS integrates AMD sensors, weapons, and command, control, communications, and intelligence (C3I) capabilities with those of higher echelon, adjacent and subordinate units. It then creates a cohesive, synergistic system capable of minimizing fratricide, protecting the force, and defeating or neutralizing the air and missile threat. It provides the automated interface for AMD elements at theater and below to the ABCS and the GCCS-Army, allowing unit commanders and staffs to plan, coordinate and control the AMD fight.

5-32. The AMDPCS is also capable of joint service information exchange and interfacing with appropriate allied C3I systems. The operators can automatically collect, process, sort, categorize, classify, correlate, store, and display air and missile track and battle command information. Commanders gain an automated data processing and exchange means by which to distribute decisions, orders, plans, and requests to higher, adjacent, and subordinate units and the supported force. The AMDPCS provides automated support to integrate engagement operations and force operations functions, while allowing for human intervention whenever required.

5-33. The AMDPCS produces a real- and near real-time airspace picture and provides the capability to coordinate A2C2 with other Army, joint, and combined elements. Significant capabilities of interest to the A2C2 functions are the AMDPCS's ability to provide either a stand-alone or fully integrated picture of the third dimension battlespace and its ability to influence combat identification. To help complete the A2C2 process, the air picture is provided to the division tactical and main command posts' A2C2 and G3 air, corps air defense elements, Army transformation elements, and various echelons above corps Army, joint, and combined locations. AMDPCS assets are the primary means of providing the air situational understanding picture to A2C2 locations and the Army Tactical Airspace Integration System. The AMDPCS can provide this air picture through unique communications assets. These assets support integration into the multi-TADIL communication architecture used

by joint, combined, and coalition platforms and by using special translator or forwarder systems such as the ADSI.

5-34. The AMDPCS capabilities include mapping; communications; call for fire; playback; security; and nuclear, biological, and chemical. Capabilities of interest to A2C2 elements include mapping and communications.

5-35. *Mapping*. Mapping includes—
- Composite military maps and false colored terrain from NIMA geospatial data. Available mapping options are ARC (equal Arc second raster Chart/map) digitized raster graphics (ADRG), digital terrain elevation data (gray scale or colored), satellite aerial image, and no map.
- Two-dimensional and three-dimensional draw and display capability.
- Sensor coverage.
- Datum transformation and coordinate conversion.
- Near real-time (as received) display of friendly and enemy ground units, friendly and enemy aircraft, cruise missiles, and UAVs in flight, friendly and enemy ships, and TBM launch points, flight paths, and impact areas.
- Displayed ACMs.
- Battlefield graphics display.
- Point-to-point distance and point-to-point sum determination.
- Line of sight determination.
- Common operational picture from MCS.
- Shot opportunity analysis.

5-36. *Communications* assets unique to the AMDPCS include—
- The AN/GSQ-240 Class 2M JTIDS radio. It allows the AMDPCS to receive IJMS data and to receive and transmit TADIL-J data. Future fieldings of the Multifunctional Information Distribution System radio will also support TADIL-J. TADIL-J is, or will be, the primary means by which the air picture information is shared among joint, combined, and coalition forces.
- The AN/ARC-187 UHF radio. It allows the AMDPCS to perform UHF voice communications with airborne platforms, such as AWACS and Hawkeye; land-based platforms, such as the Air Force air operations center and Marine tactical air operations center; and surfaced-based platforms, such as Aegis. This radio is used to coordinate TADIL-A net entry procedures, coordinate the joint interface control officer with the track data coordinator, monitor the voice product net, and participate on the air defense C2 net. A second AN/ARC-187 allows the AMDPCS to receive and transmit data using the TADIL-A UHF waveform. TADIL-A UHF can be designated as the secondary or tertiary means by which the air picture information is shared among joint, combined, and coalition forces.
- The Harris RF-350 Series HF radio and Harris RF-355 Power amplifier. They allow the AMDPCS to perform long-range HF voice communications with airborne platforms, such as AWACS and Hawkeye; land-based platforms, such as the Air Force air operations center and the Marine tactical air operations center; and surfaced-based platforms,

such as Aegis. This radio and amplifier are used to coordinate TADIL-A HF net entry procedures. Once permission to enter the TADIL-A HF net is granted, the RF-350 is switched to the data mode and allows the AMDPCS to receive and transmit data using the TADIL-A HF waveform at distances far greater than the capabilities of UHF radios. TADIL-A HF can be designated as the secondary or tertiary means by which the air picture information is shared among joint, combined, and coalition forces.

- Modems capable of supporting point-to-point protocols such as TADIL-B or the ATDL-1. These modems allow the AMDPCS to receive and transmit TADIL-B and ATDL-1 messages with land-based platforms, such as the Air Force air operations center, the Marine tactical air operations center, and other combined or coalition organizations. They use direct wire, mobile subscriber equipment, Army common user system, and Tri-Service Tactical Communications. They must use an indigenous analog-to-digital converter. TADIL-B or ATDL-1 can be designated the secondary or tertiary means by which the air picture information is shared among joint, combined, and coalition forces.

- The AMDPCS contains numerous other radios that are not unique to the AMD mission. However, without the radios identified above, no air picture provision would exist for the third-dimension battlespace for either the ABCS or A2C2 world.

5-37. Combat identification capabilities in the AMDPCS include:

- The ability to import external track data and identification information from airborne platforms, such as AWACS, Rivet Joint, and Hawkeye; land-based platforms, such as the Air Force air operations center and Marine tactical air operations center; and surfaced-based platforms, such as Aegis. This ability helps correlate with local track data, assign track identification, increase situational understanding, improve greater shot opportunities against hostile aircraft, and prevent or reduce fratricide events.

- The indigenous capability to interrogate selective identification features (SIF) and identification, friend or foe and to share that information among all multi-TADIL participants. Applying identifications assists the joint, combined, and coalition air defense units or platforms and A2C2 cells in their ability to command and control friendly assets and perform airspace deconfliction.

- The AMDPCS can interface directly with the Theater Battle Management Core System. This interface allows the AMDPCS to automatically download the ATO and ACO and submit airspace control requests as necessary. The ATO provides the air taskings for the period covered by the ATO and the associated SIF codes for each sortie. This information is provided to the A2C2 cells to assist in C2 and airspace deconfliction. Importing the ACO allows the AMDPCS to automatically display all airspace control measures being implemented during the associated time period. The AMDPCS can forward this graphic to the A2C2 cells and the TAIS to facilitate C2 and airspace deconfliction.

- The AMDPCS also can react outside the normal air tasking order cycle to initiate immediate identification and situational understanding of

friendly tracks over the multi-TADIL network that are not listed in the ATO. This capability does not reside anywhere else in the US Army. Commanders may implement this action under operational or emergency conditions and provide immediate support to the A2C2 cells. For example, prior to the conduct of a movement to contact, a corps or brigade commander may want to send out an UAV for reconnaissance of the expected maneuver area and enemy locations. As the UAV becomes airborne, the appropriate component of the AMDPCS will take the UAV under track, assign it a friendly identification, and transmit the track information and identification to all users in the airspace. In another example, during a movement to contact operation, a soldier is injured requiring medical evacuation air ambulance support. The AMDPCS will initiate track information, assign a friendly identification to the aviation asset, and provide the information to all users of the airspace, the A2C2 cells, and the TAIS. In both examples, the immediacy of the actions taking place precluded them from being incorporated in the normal ATO cycle. This means other users of the airspace would have no knowledge of the flights, which could result in friendly aircraft being engaged or cause safety of flight issues.

AIR DEFENSE SYSTEM INTEGRATOR

5-38. The ADSI is a multilink command, control, and communications system. It transmits, receives, translates, and forwards TADIL-A, TADIL-B, JTIDS or TADIL-J, FAAD data link, NATO Link-1, ATDL-1, tactical information broadcast service, tactical recovery of aircraft and personnel, surveillance radar data, and other source information among units. It provides a joint tactical picture at multiple operational facilities. The ADSI is a modular C2 system based on over 100 software modules and nearly 2 million lines of code. A typical ADSI has multiple processors connected over an Ethernet TCP and IP local area network. Army ADSIs are used today from the theater level down to the Patriot firing battery level. These integrators provide theater air and missile defense (TAMD) early warning, situational understanding, multi-TADIL and space-based intelligence communications processing, planning, and command and control. At the Army air and missile defense command, air defense artillery brigades, and Army aviation TAIS, the ADSI serves as the single point of entry for space-based intelligence and multi-TADIL architecture nets. This information is used for development of the single integrated air picture over the joint composite tracking network, common tactical picture over the joint data network, and the COP over the joint planning network. The ADSI is currently a commercial off-the-shelf product. However, the ADSI is the joint services go-to-war command, control, and communications processor. In the Army, it replaced a less capable, unsupportable, and antiquated AN/TSQ-73, Missile Minder, at air defense units. At other Army locations, it provides a TAMD situational understanding capability that did not exist previously.

TACTICAL AIRSPACE INTEGRATION SYSTEM

5-39. TAIS is the designated ABCS used by the Army to integrate A2C2. It provides automated A2C2 planning; enhanced A2C2 execution; and improved theater, intracorps, intercorps, and division air traffic service (ATS) support.

It is used to synchronize battlespace in the third (altitude) and fourth (time) dimensions. It also has an added civil and government interagency capability. TAIS takes input from multiple sources and combines them into a single picture. Combined with the electronic ground picture, TAIS provides the commander with visualization for both the air and ground battlespace. TAIS provides a direct link to the TAGS through interface with the TBMCS. Replacing the AN/TSC-61B flight coordination central, TAIS provides automated A2C2 planning; enhanced A2C2 execution; and improved theater, intra- or intercorps, and division ATS support. Although TAIS provides support at division levels and above, its products, such as the digital airspace overlay, are accessible from all Army Battle Command Systems, regardless of the echelon. Battalion and brigade-level A2C2 elements can access each TAIS A2C2 product from the Army Battle Command Systems located at their levels. TAIS is currently being fielded Armywide. Appendix C discusses TAIS in detail.

5-40. For A2C2 elements, TAIS provides—
- Two- and three-dimensional situational display.
- Integrated ground and air picture.
- ABCS communications.
- Air traffic control and tactical communications.
- Near real-time air track TADIL feeds.
- A2C2 battlespace situational understanding.
- Deconfliction of near real-time airspace requests.
- Distribution of battlefield overlays.
- Distribution of airspace control measures.
- Alert generation of aircraft within airspace control measures.

ALL SOURCE ANALYSIS SYSTEM

5-41. The ASAS is the intelligence and electronic warfare subelement of the ABCS. It provides the fused intelligence picture as received from the supporting analysis control element. The ASAS displays friendly and enemy units, receiving enemy units from the analysis control element and friendly units through the MCS. The ASAS disseminates the enemy picture to the MCS. It provides combat leaders with the all source intelligence needed to view the battlefield and more effectively conduct the battle. The ASAS provides a tactically deployable system. It can receive and correlate data from strategic and tactical intelligence sensors and sources; produce enemy situation displays; and rapidly disseminate intelligence information. In addition, it nominates targets, manages collection requirements, and provides operations security support. The ASAS is designed to operate in a joint environment across the spectrum of conflict.

5-42. The ASAS capabilities cover map backgrounds and overlay graphics, communications, databases, imagery, target planning, and user utilities. Capabilities of interest to A2C2 elements include map backgrounds and overlay graphics, communications, databases, imagery, target planning, and user utilities.

5-43. *Map backgrounds and overlay graphics.* Map backgrounds and overlay graphics include—

- Standard NIMA products World Vector Shoreline, digital feature analysis data, and digital terrain elevation data.
- Datum transformation and coordinate conversion.

5-44. *Communications.* Communications include—
- Automatic message parsing, filling, and routing.
- Report and message creation, edit, review, and dissemination.
- Enhanced intelligence preparation of the battlefield tools.
- Overlay creation, display, printing, unit plotting, and transmission to other systems.

5-45. *Databases.* Databases include—
- Displayed friendly and enemy databases.
- Automated database fills from other intelligence systems.

5-46. *Imagery.* Imagery includes—
- Receiving, displaying, and annotating imagery in a national imagery transmission format.
- Displaying live UAV video.
- Situation and event planning to include named areas of interest (NAIs), time-phased lines, and event matrix reports.
- Creating and modifying areas of interest, no-go and slow-go areas, avenues of approach, mobility corridors, and key terrain.

5-47. *Target planning.* Target planning includes creating and maintaining target databases and reports for NAIs, target areas of interest, high-payoff targets, high-value targets, and attack guidance.

5-48. *User utilities.* User utilities include—
- Coordinated conversions.
- Filed manipulation.
- Printed windows, reports, and overlays.
- Overlaid plotting to map scales.

INTEGRATED METEOROLOGICAL SYSTEM

5-49. The IMETS provides commanders at all echelons with an automated tactical weather system. This system receives, processes, and disseminates weather observations, forecasts, battlefield visualization, and weather effects decision aids to ATCCS, BOS, and other users. The IMETS processes weather data into easily displayed digital information. This information ranges from forecasts tailored to the size of each commander's area of responsibility to the latest, high-resolution weather satellite imagery overlaid with fronts and weather systems. These digital products provide color-coded weather effects areas, showing when adverse weather limits critical combat systems capabilities. The IMETS provides weather support to both mission planning and execution. It supports day, night, and all weather operations; fixed- and rotary-wing, manned, and unmanned aerial vehicles; drop zones; low-level transit routes; and forward arming and refueling point missions. It provides weather products such as route weather visualization, mission weather forecasts and nowcasts, and visibility and wind overlays.

5-50. IMETS provides five products of interest to A2C2 elements:

- Integrated weather effects decision aid. This common ABCS application overlays forecasted favorable, marginal, or unfavorable weather effects on missions, weapon systems, subsystems, and components on the common tactical picture.
- Weather contours. This common ABCS application overlays forecasted weather parameters critical to the mission of the specific BOS being supported.
- WebPage products, such as—
  - Weather satellite imagery and sensor data.
  - Weather model visualization.
  - Radar images.
  - Battle update briefings, especially on weather.
- Messages, such as—
  - Weather warnings.
  - Forecasts.
  - Observations.
  - NBC basic wind report.
  - NBC chemical downwind report.
- Joint common database weather feature. This common ABCS application accesses the joint common database for severe weather warnings and mission area forecasts. In the case of severe weather warnings, it automatically alerts the user when new information shows up in the joint common database and plots the warning area on the common tactical picture.

DIGITAL TOPOGRAPHIC SUPPORT SYSTEM

5-51. The DTSS is a tactical, computer-based system that provides automated assistance to the Army's terrain analysis function. It can receive, format, reformat, create, store, retrieve, update, manipulate, and condense digital geospatial data. This system produces terrain analysis products such as on- and off-road mobility maps, line-of-sight intervisibility plots, concealment maps, on-road chokepoint maps, and tactical fording and bridging maps. The DTSS is fielded to terrain teams at brigade through EAC.

CSSCS

5-52. The Combat Service Support Control System is the combat service support administrative and logistic automated workstation component of ATCCS. It provides battlefield decision support and situational understanding for planning and controlling the personnel and logistic support of combat operations. This system provides information on all classes of supply, field services, maintenance, medical services, and movements. Staffs consolidate and collate the information into situation reports and planning estimates for current and future operations. CSSCS provides materiel, supply, and personnel status of units and identifies logistic capabilities to resupply units for subsequent combat operations. The commander's tracked items list includes those items of command interest. These items are controlled by command and tracked by CSSCS. Positioning of logistic support bases down to brigade and

task force level on CSSCS is a cue for the standard use Army aircraft flight route development by A2C2 elements. Other major capabilities are—

- Resource status summaries of current logistic information by class of supply, item, or unit (color-coded charts or detailed tabular reports).
- Deliberate or hasty course of action analysis, using either current or planned task organization, based on approved planning factors.
- Unit task organization tracked to company level, providing a structure for resource tracking.

FBCB2

5-53. Force XXI Battle Command Brigade and Below is a digital battle command information system that provides integrated, on-the-move, and timely battle command information to tactical combat, combat support, and combat service support leaders and soldiers. FBCB2 completes the ABCS information flow process from brigade to platform and across all platforms within the brigade. It supports situational understanding down to the soldier and platform level across the BOSs at brigade and below. Additionally, FBCB2 enables commanders to operate remotely and maintain connectivity to ABCS common operational picture information regardless of command location. It also enables commanders to digitally control and monitor their subordinate units' status and position. FBCB2 provides ABCS with automated positional friendly information and current tactical battlefield geometry for friendly and known or suspected enemy forces. FBCB2 will be fielded to mounted and dismounted maneuver forces—legacy, interim, and objective. FBCB2 will be fielded to armor, cavalry, reconnaissance, armored cavalry, mechanized infantry, infantry, and aviation units and their associated combat support and combat service support units normally provided from division or corps.

CONNECTIVITY AT ECHELONS ABOVE CORPS

5-54. At EAC, the A2C2 element must be able to receive and disseminate information from the TBMCS. The A2C2 element must be able to pass information from subordinate headquarters to TBMCS. It must also be prepared to deconflict airspace for both subordinate headquarters and joint airspace users. It must rapidly accomplish these functions while retaining the ability to display, send, and receive data electronically. TAIS, when fully fielded across the force, will become the primary system used by A2C2 elements at EAC to link joint and multinational systems such as TBMCS. In the interim, the A2C2 elements will use the various Army Battle Command Systems—GCCS-Army, MCS, AFATDS, AMDPCS, and ASAS—to integrate the A2C2 effort. The organizations available for A2C2 functions include the battlefield coordination detachment (BCD) and AAMDC.

5-55. The BCD accomplishes its mission with organic unit equipment and JAOC-provided systems. It task-organizes its systems to meet operational constraints—such as personnel and working space—and theater-specific requirements. The Army Battle Command Systems available to the BCD for airspace management and deconfliction are GCCS-Army, MCS, AFATDS, AMDPCS, TAIS, and ASAS. The JAOC provides TBMCS, C2IPs, and ADSI.

5-56. The AAMDC supports the ARFOR commander and integrates its efforts with the ARFOR A2C2 element. Additionally, the AAMDC LNO at the JAOC integrates his effort with the BCD A2C2 element. The AAMDC accomplishes its mission with organic unit personnel and equipment. It task-organizes its systems to meet operational constraints—such as personnel and working space—and theater-specific requirements. The automation systems available for airspace management and deconfliction are GCCS-Army, MCS, AFATDS, AMDPCS, ASAS, and joint defense planner.

CONNECTIVITY AT CORPS

5-57. Corps A2C2 cells must be prepared to receive and send information to and from every subordinate headquarters on every system occupying airspace within the corps area of operations (AO). These cells must rapidly pass information from EAC to the corps' subordinate units and deconflict airspace operations within and above their AO.

5-58. The corps A2C2 elements must be able to send, receive, and compile A2C2 overlays. It also must be able to access real-time aviation weather and disseminate it to subordinate headquarters as well as provide real-time notification of—

- UAV launch and recovery areas, launches, flight routes, mission orbit areas, orbit recovery areas, and recoveries.
- Artillery and ADA operational status, planned targets, and firing status.
- Enemy air movement and TBM launch data.
- Chemical attacks.
- Friendly air movements of division, corps, EAC, and special operations forces operations.
- Shaping operations.
- Air Force, Navy, and allied air sorties.

5-59. The six Army Battle Command Systems available to corps A2C2 elements for airspace management and deconfliction are GCCS-Army, MCS, AFATDS, AMDPCS, TAIS, and ASAS.

5-60. The corps A2C2 element at the main command post (CP) must ensure that connectivity is established with the corps tactical CP, corps rear CP, corps aviation brigade, corps ADA brigade, corps military intelligence brigade, and corps artillery. This element must also be established with the ARFOR A2C2 element, adjacent corps or multinational units, air support operations center, division A2C2 elements, and ATS battalion. It also must be established with any other unit that may be operating within the corps AO and requiring the use of airspace.

CONNECTIVITY AT DIVISION

5-61. The organization of the A2C2 elements within the command posts at division is similar to that at corps. The division's primary focus is on the conduct of battles and engagements. Airspace control tasks are primarily those required to synchronize all airspace users of the combined arms team and supporting sister services with the close battle.

5-62. The five Army Battle Command Systems available to division A2C2 elements for airspace management and deconfliction are MCS, AFATDS, AMDPCS, TAIS, and ASAS.

5-63. The division A2C2 element at the main CP must ensure that connectivity is established with the corps A2C2 element, air liaison officer (ALO), tactical air control party (TACP), subordinate brigade S3 air, and ATS company. It must be established with the division tactical CP, rear CP, aviation brigade, air defense artillery battalion, and military intelligence battalion. In addition, connectivity is established with adjacent division or multinational units, air defense artillery, and any other unit that may be operating within the division AO that requires the use of airspace.

CONNECTIVITY AT ECHELONS BELOW DIVISION

5-64. Formal A2C2 elements are not established below the division level. However, much information—such as the ACO, ATO, ACM, and FSCM— must rapidly move from the battalion level throughout every level of the Army to the JAOC level. Commanders must connect further within battalions and brigades and among the main CP, tactical CP, and brigade or battalion support areas. Information must flow freely within maneuver units as well as to higher and lower headquarters.

5-65. The Army Battle Command Systems available to the brigade and battalion staffs for airspace management and deconfliction are MCS, AFATDS, AMDPCS, and ASAS. Each system can display the airspace overlay provided by TAIS.

5-66. The S3 air at brigade and below must ensure that connectivity is established with its tactical and rear CPs; the next higher S3 air or division A2C2 element; ALO and TACP; fire support officers; liaison officers from supporting air defense artillery; the military intelligence UAV; and aviation units. It also is established with any other unit that may be operating within its area that requires the use of airspace.

INTERIM BRIGADE COMBAT TEAM

5-67. The interim brigade combat team (IBCT) does not have a formal A2C2 element. However, the air defense and airspace management cell functions as the IBCT staff integrator of A2C2. This cell assists the S3 in developing and requesting airspace control measures. It coordinates and integrates A2C2 throughout the IBCT by relaying appropriate information concerning airspace management. The air defense and airspace management cell may be required to coordinate with joint or multinational forces to integrate the IBCT A2C2 requirements into the operations. The IBCT requires augmentation by a divisional, corps, or echelons above corps TAIS to adequately deconflict airspace and perform the full spectrum of A2C2 planning, operations, and ATS.